Contest Problem Set 12221
Sprint Round Problem 25

David Sun

Math League, LLC

On Monday, Travis averaged 45 miles per hour on his roundtrip journey from home to work and then back home. On Tuesday, Travis averaged 40 miles per hour on the same roundtrip journey, and his roundtrip journey took 12 minutes longer than it did on Monday. How far, in miles, is Travis' home from his work?

Let d be the number of miles from Travis' home to his work.

Let d be the number of miles from Travis' home to his work.
His roundtrip journey is twice that distance, or $2 \cdot d$.

Problem	Solution	Reflection
○	●○○○○○○○○○○○○○	○

Compute the distance, in miles, from Travis' home to his work.

Let d be the number of miles from Travis' home to his work.

His roundtrip journey is twice that distance, or $2 \cdot d$.

Let t be the number of hours Travis' roundtrip takes on Monday.

Problem	Solution	Reflection
O	●○○○○○○○○○○○○○	O

Compute the distance, in miles, from Travis' home to his work.

Let d be the number of miles from Travis' home to his work.
His roundtrip journey is twice that distance, or $2 \cdot d$.
Let t be the number of hours Travis' roundtrip takes on Monday.
We're given that Travis' travel rate on Monday is 45 mph.

Problem
○

Solution
●○○○○○○○○○○○○

Reflection
○

Compute the distance, in miles, from Travis' home to his work.

Let d be the number of miles from Travis' home to his work.
His roundtrip journey is twice that distance, or $2 \cdot d$.
Let t be the number of hours Travis' roundtrip takes on Monday.
We're given that Travis' travel rate on Monday is 45 mph.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

Problem   Solution   Reflection

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

The number of hours Travis' roundtrip takes on Tuesday is $t + \frac{1}{5}$.

Problem | Solution | Reflection
○ | ○●○○○○○○○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

The number of hours Travis' roundtrip takes on Tuesday is $t + \frac{1}{5}$.

We're given that Travis' travel rate on Tuesday is 40 mph.

Problem | Solution | Reflection
○ | ○●○○○○○○○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

The number of hours Travis' roundtrip takes on Tuesday is $t + \frac{1}{5}$.

We're given that Travis' travel rate on Tuesday is 40 mph.

$$2 \cdot d = 40 \cdot \left(t + \frac{1}{5}\right) \tag{2}$$

Problem | Solution | Reflection
○ | ○○●○○○○○○○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

The number of hours Travis' roundtrip takes on Tuesday is $t + \frac{1}{5}$.

We're given that Travis' travel rate on Tuesday is 40 mph.

$$2 \cdot d = 40 \cdot t + 40 \cdot \frac{1}{5} \tag{2}$$

Problem	Solution	Reflection
○	○○○●○○○○○○○○○	○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

On Tuesday, Travis' roundtrip took an additional 12 minutes, which is $\frac{1}{5}$ of an hour.

The number of hours Travis' roundtrip takes on Tuesday is $t + \frac{1}{5}$.

We're given that Travis' travel rate on Tuesday is 40 mph.

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

Problem | Solution | Reflection
○ | ○○○○●○○○○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

Problem | Solution | Reflection
○ | ○○○○●○○○○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

$$45 \cdot t = 40 \cdot t + 8.$$

Problem	Solution	Reflection
○	○○○○○●○○○○○○○	○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

$$45 \cdot t - 40 \cdot t = 8.$$

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

$$(45 - 40) \cdot t = 8.$$

Problem
○

Solution
○○○○○○○●○○○○○○

Reflection
○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

$$5 \cdot t = 8.$$

Problem | Solution | Reflection
○ | ○○○○○○○○○●○○○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

Substituting $45 \cdot t$ for $2 \cdot d$ in (2), we have

$$t = \frac{8}{5}.$$

Problem | Solution | Reflection
○ | ○○○○○○○○○○●○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

$$t = \frac{8}{5} \qquad (3)$$

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

$$t = \frac{8}{5} \qquad (3)$$

Substituting $\frac{8}{5}$ for t in (1), we have

Problem | Solution | Reflection
○ | ○○○○○○○○○○●○○○○ | ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

$$t = \frac{8}{5} \qquad (3)$$

Substituting $\frac{8}{5}$ for t in (1), we have

$$2 \cdot d = 45 \cdot \frac{8}{5}.$$

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

$$t = \frac{8}{5} \tag{3}$$

Substituting $\frac{8}{5}$ for t in (1), we have

$$2 \cdot d = 45 \cdot \frac{1}{5} \cdot 8.$$

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

$$t = \frac{8}{5} \qquad (3)$$

Substituting $\frac{8}{5}$ for t in (1), we have

$$2 \cdot d = 9 \cdot 8.$$

Problem   Solution   Reflection
○   ○○○○○○○○○○○○○●○   ○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \qquad (1)$$

$$2 \cdot d = 40 \cdot t + 8 \qquad (2)$$

$$t = \frac{8}{5} \qquad (3)$$

Substituting $\frac{8}{5}$ for t in (1), we have

$$2 \cdot d = 72.$$

Problem	Solution	Reflection
○	○○○○○○○○○○○○○●	○

Compute the distance, in miles, from Travis' home to his work.

$$distance = rate \cdot time$$

$$2 \cdot d = 45 \cdot t \tag{1}$$

$$2 \cdot d = 40 \cdot t + 8 \tag{2}$$

$$t = \frac{8}{5} \tag{3}$$

Substituting $\frac{8}{5}$ for t in (1), we have

$$d = \boxed{36}.$$

Concepts

Concepts

- rates

Concepts

- rates
- systems of equations

Concepts

- rates
- systems of equations
- substitution